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(54) CREAM POWDER

(71) We, HENKEL & CIE. GMBH, a German Company, of 67, Henkelstrasse, Duesseldorf, 4000, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a free-flowing, dry, fat-containing edible cream powder, especially for the production of cake fillings and decorations.

In the confectionery trade shorter working hours and the growing shortage of workers bring considerable problems and attempts have already been made to solve these by an increasing use of ready-mixed cake flours, or so-called "cake mixes". The latter produce economies in time, lightening of work and risk free processing therefore making it possible to satisfy the ever-increasing demand for confectionery. Since confectionery goods are frequently supplied with cream decorations based on butter cream, this also involves a substantial delay in the finishing of the goods ready for sale. Apart from this the stability of shape and keeping quality of these cream decorations have previously been of short duration. Here also there is a need for a cream base always ready for use, which again provides economies in time, lightening of work, risk-free processing, longevity in keeping quality and stability of shape of the finished decorations.

The object of the invention is therefore to provide a free-flowing, dry, fat-containing, relatively problem-free edible cream powder, especially for the production of cake fillings and decorations.

According to the invention the mixture of the dry substances of the cream powder is made up substantially from the following components:

65 to 85, preferably 70 to 80% by weight, based on the total weight of the cream powder, of a pulverulent component, consisting of

25 to 99, preferably 27 to 40% by weight, based on the weight of the pulverulent component, of a protein-containing product,

1 to 5% by weight, based on the weight of the pulverulent component, of stabilising or binding means, especially swellable starch, and

up to 70% by weight, based on the weight of the pulverulent component, of sugar and/or other additives usual in cream, and also

15 to 35, preferably 20 to 30% by weight, based on the total weight of the cream powder, of a fat component, consisting of

80 to 95, preferably 85 to 93% by weight, based on the weight of the fatty component, of an edible fat with a rising melting point between 30 and 35°C, and a dilatation at 20°C. of 800 to 1500, preferably 1100 to 1400, and

5 to 20, preferably 7 to 15% by weight, based on the weight of the fatty component, of a fat-soluble emulsifier with a HLB value of from 5 to 16, and the pulverulent component encloses the fatty component.

The pulverulent component includes as the protein-containing product powdered milk, which is preferably used as instant full cream or skimmed milk powder, and powdered egg, preferably complete egg powder.

Suitable stabilisers and binders are gelatine, alginate, carob bean kernel flour, tragacanth, pectin, guaiacum flour, agar-agar, polyacrylic acid, polyvinyl alcohol, methylcellulose, carboxymethylcellulose, and especially, swellable starch, which leads to a cream consistency of a particularly stable form. These substances primarily increase the shock resistance properties of the cream.

The sugar content possibly desired may consist of all known kinds of sugar, but especially of powdered sugar, glucose and vanilla sugar which at the same time has a taste-forming action. The amount of sugar contained is simply dependent on taste. Sugar-free cream powder for diabetics may also be made, which to provide taste has an addition of about 0.5% by weight of a commercial sweetener such as saccharin or sodium cyclamate. It is acknowledged that the "Artificial sweetener in food regulations 1969" prohibit the use of cyclam-

ates in food and therefore the applicants make no claim to compositions containing sodium cyclamate whilst it remains a prohibited compound.

Among other additives usual in full cream are acidifying agents such as sodium, potassium and calcium salts of ortho- and pyro-phosphoric acids, gluconic acid γ-lactone, and of tartaric and citric acids. They are often very advantageous, especially when swellable starch is used as stabiliser, since the retardation sometimes caused by the high fat fraction of the powder of the capacity of the starch to form a paste is thereby compensated.

The edible fats used are those the rising melting points of which lie below body temperature, especially between 30° and 35°C., and which have dilatation values at 20°C between 800 and 1500, especially between 1100 and 1400. Natural fats and fats modified by various known processes, or fatty mixtures with corresponding melting points and dilatation values are suitable. The hydrogenated groundnut oil described in Example 1, which gives a product specially stable on storage, is preferred.

In order to facilitate the mixing of the cream powder with water, a fat-soluble emulsifier is added to the edible fat which has a HLB value of from 5 to 16. For this purpose, for example, mono- and di-glycerides of saturated and unsaturated fatty acids, such as stearic and oleic acid, traces of triglycerides not being detrimental, lactic acid monoglyceride, polyglycerine-fatty acid esters, sorbitol-fatty acid esters, polyhydroxyethylene-sorbitol-fatty acid esters, diacetyltartaric acid-mono-/-di-fatty acid glycerides, lecithin and combinations of these compounds, are suitable. Particularly good results were obtained from a mixture of 1 part by weight of polyhydroxyethylene-sorbitol-stearate and 1.5 parts by weight of sorbitol stearate.

The "HLB" value of an emulsifier represents its position in the so-called "hydrophilic-lipophilic balance" that is, it gives information on the equilibrium of the sizes and strengths of the hydrophilic (or polar) and the lipophilic (or non-polar) groups of an emulsifier. The method of determination may be obtained from the booklet "The Atlas HLB System—The modern method for the determination of suitable emulsifier systems" of Atlas Chemical Industries Inc. (1963).

Numerous known solid-liquid mixing processes are suitable for the production of the cream powder. A specially advantageous cream powder is obtained, however, if the dry components are well mixed together, converted into a free-falling or delayed-falling cloud of powder and the emulsifier-containing fat heated to 50° to 60°C. is sprayed or injected into this cloud of powder. The still liquid fat particles are then immediately coated with the mixture of dry substances and only then completely crystallise.

Since powdered milk and sugar powder, which in most cases represent the chief components of th epulverulent cream powder, are known to have a tendency to form agglomerates, it is expedient to effect the addition of the pulverulent components so that the powder is enabled to come in contaot with the sprayed-in fat in the most finely divided state possible. For this purpose the powder, for example, may be supplied by way of a shaking screen or, in the case of smaller apparatus, by way of a vibrating trough. It is further advantageous if the form of the free-falling or delayed-falling stream of powder is adapted to the form of the spray of injecter fat. This is very easily possible with the use of a shaking screen.

It is further expedient for the mixture to be subjected to a further treatment, after the fat is sprayed in, so as to obtain a still better homogenous distribution of the fat in the pulverulent components. Such an after-treatment may be effected, for example, by rotating the mixture in a granulating device or in another rotating vessel. The desired effect can also be obtained by means of one or more shaking screens. The use of an obliquely supported and/or conically shaped drum, in which the material is further transported during the rotation, has been found particularly advantageous for this purpose. By alteration of the slope or the opening angle and the speed of rotation, the duration of the material in the drum and consequently the granulation process can be controlled. In this way the structure of the product can vary from floury to gritty.

When such a drum is used, it is further expedient if particles sticking to the inside of the drum are continuously stripped off by means of a brush.

Instead of an after-treatment, as described above, after the fat has been sprayed in, an air separation of the material may also be carried out, and the light fraction can be mixed again with the pulverulent starting material or separately sprayed a second time with fat. According to a particularly advantageous form of the process of the invention, the free fall of the pulverulent component is slowed down by a stream of gas directed against the powder from underneath to above. This stream of gas, however, is not, as in the known fluidised bed process, strong enough for the powder to remain in a constant whirling motion, but the particles respond to the force of gravity with a certain retardation. In this way the separate particles are exposed longer to the fat spray, and in many cases an after-treatment or separation of the sprayed material is unnecessary.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:—

Figs. 1 and 2 show two forms of apparatus which may be used for mixing the powder of the invention.

Fig. 1 shows an apparatus which can be used for the spraying of the free-falling pulverulent component and for the subsequent after-treatment by rotation. This apparatus is also suitable for the continuous production of smaller amounts for experimental purposes. The pulverulent material is in the stock container 1. It is advantageous to keep the powder in a loose state by blowing air into the lower part of the container 1 by means of jets (not shown). The powder passes via the dosing screw conveyor 2 and the vibrating screen 3 into the funnel 4, which causes the falling stream to assume a convex shape. In this way the falling stream of powder is adapted in its shape and density to the spray of fat, and an optimal thorough mixing of the components is attained. The fat is sprayed in by means of the jet 5, in which it arrives from the stock container 7 via the dosing pump 6. The stock container 7 is kept by means of a thermostat at a temperature which lies a few degrees above the melting temperature of the fat used. The particles of the mixture arrive in the cone-shaped rotary drum 8, the conical shape of the drum being adapted to the opening angle of the fat spray so that no particles with a greater speed strike on the wall of the drum. When the fat is sprayed into the free-falling stream of powder, a jacket of dry substance forms round each droplet of fat. The particles so formed, owing to their greater weight, fall on the wall of the drum in a shorter line of flight than any possible residual particles of dry substance. Owing to the rotary movement of the drum, the particles formed roll through the residual dry substance and bind this. The particles solidify owing to the crystallisation of the fat begun in the meantime and roll over the edge of the rotary drum into the collecting vessel. Particles sticking to the wall of the drum are removed by means of the brush 10. In an enlarged form of this apparatus the addition of the material may be effected via a correspondingly large shaking screen.

Fig. 2 shows an apparatus in which the falling down of the pulverulent components is retarded by a stream of air and with which at the same time a separation of the sprayed material and a return of the light parts into the spray zone is effected. The pulverulent material goes from stock vessel 11 via the feed line 12 into the trap 13 and is blown from this tangentially into the cylindrical container 14 and is thereby distributed over the whole cross-section of the container. Air sucked in from below which is admitted by the annular opening 15,16 passes against the falling powder. The speed of the air is such that the particles in the middle cylindrical part of the container slowly sink down. The fat is passed in through two opposed spray jets 17 via the dosing pump 18. The stream from the jets is directed into the inside of the tower. More than two jets may also be used, in which case the spacing of the jets must be sufficiently great to prevent the droplets of fat from uniting. After passing the spray zone the sprayed powder reaches the lower conical part 19 of the apparatus. On account of the tapering, the speed of the air stream introduced from below is to great in this part that the lighter parts are carried back upwards into the spray zone. The heavy fat-containing parts of the powder arrive in the funnel 20 and may be conveyed from there to a packing device.

It has been found that with use of this apparatus, a subsequent granulation can be abandoned. The size of the particles may be influenced by the speed of the stream of air sucked in as well as by the jets used or the size of the droplets or fat. The apparatus described is specially suitable for the continuous production of large quantities.

By means of the process according to the invention and the above described apparatus, cream powders can be produced which even with a relatively high content of low-melting fat, do not tend to come out of admixture or to cake together. They contain all the ingredients needed for the preparation of a cream powder, so that, for the preparation of the cream, only liquid in the form of water or milk and possibly fresh egg has also to be added. Obviously the user can add at will further pulverulent ingredients which serve for the improvement and the individual taste formation of the cream, for example almonds, nuts and the like.

The cream powders prepared by the process of the invention have a uniform particle structure. Even with a high fat content of 20% and over these powders are dry and do not give any fat. Since the raw materials and finished products are not exposed to rubbing or kneading forces during this process and are carried predominantly by a stream of air, the mixtures are loose and enriched with air. This fact has a favourable effect on the creams produced therefrom; these possess a particularly smooth structure.

The very fine distribution of the fat and the uniform casing of the fat particles causes a very good storability of the products. In experiments on storage it was found that even without addition of preservatives, after storing for six months in a suitable package, neither rancidity nor deterioration of taste of the products were ascertainable. On the contrary the cream prepared from the cream powders used in these storage experiments was found to be fresh and of satisfactory taste. The packing material was not spoilt by migrating fat.

The products are stable against the action of cold and heat within wide limits as well as against vibrations, such as occur during transport.

Example 1

20 kg/hr of a mixture of 22.0 parts by weight of instant skimmed milk powder, 25.0 parts by weight of powdered sugar, 18.0 parts by weight of glucose, 4.1 parts by weight of vanilla sugar, 3.0 parts by weight of lecithin powder, 0.8 parts by weight of complete egg powder, 1.6 parts by weight of swellable starch and 0.5 parts by weight of pulverised sodium dihydrogen phosphate were exposed to free fall, using an apparatus according to Fig. 1, via a shaking screen 3 into a funnel 4, which was slightly inclined to the vertical and the tubular projection of which had a diameter of about 5 cm. 6.66 kg. per hour of a mixture heated to 60°C. of 85.0 parts by weight of hydrogenated groundnut oil, which had a melting point of 32 to 34°C., a dilatation value of 1250 at 20°C. and an iodine value of 70, 6.0 parts by weight of polyhydroxyethylene-sorbitol stearate and 9.0 parts by weight of sorbitol stearate, was sprayed into the falling cloud of powder by means of a binary jet 5. The cream powder formed fell into a conical rotary drum 8 120 cm in length, which with an aperture angle of 20°, rotated at 20 revolutions per minute. The diameter of the drum was 40 cm at the narrow end, and 80 cm at the wider end. The particles of powder were granulated to a uniform size of grain while rolling down against the wall of the drum and were collected in a vessel and packed.

Example 2

In an analogous way to that described in Example 1, 20 kg of a pulverulent mixture of 28.6 parts by weight of skimmed milk powder, 28.6 parts by weight of sugar powder, 14.0 parts by weight of glucose, 3.7 parts by weight of vanilla sugar, 0.6 parts by weight of complete egg powder, 3.6 parts by weight of swellable starch and 0.4 parts by weight of citric acid were sprayed per hour with 5 kg of a mixture of 91.5 parts by weight of hardened soya fat with an acid number <0.1, an iodine value of 70—78, a rising melting point of 32 to 34°C. and a dilatation at 20°C. of 1350, 3.0 parts by weight of a mixture of 67% of mono, 30% of di- and 3% of tri-glycerides of a combination of 1/3 palmitic and 2/3 stearic acids, 4.0 parts by weight of oleic acid monoglyceride and 1.5 parts by weight of lecithin.

Example 3

In a way analogous to that described in Example 1, 20 kg of a pulverulent mixture of 28.5 parts by weight of skimmed milk powder, 30.7 parts by weight of sugar powder, 10.7 parts by weight of glucose, 4.0 parts by weight of vanilla sugar, 0.3 parts by weight of egg yolk powder, 0.4 parts by weight of egg white powder, 3.5 parts by weight of sodium alginate and 0.4 parts by weight of disodium phosphate were sprayed per hour with about 5.5 kg. of a mixture of 93 parts by weight of hardened whale fat, acid value <0.1 I.V. 65—75, rising melting point 33 to 35°C., dilatation at 20°C. 1150, 3.0 parts by weight of a mixture of 67% of mono-, 30% of di- and 3% of tri-glycerides of a combination of 1/3 palmitic and 2/3 stearic acids and 4.0 parts by weight of oleic acid monoglyceride.

Example 4

According to the method of the above Examples, 20 kg. of a pulverulent mixture of 18.1 parts by weight of skimmed milk powder, 32.2 parts by weight of sugar powder, 15.8 parts by weight of glucose, 3.9 parts by weight of vanilla sugar, 0.6 parts by weight of complete egg powder, 1.8 parts by weight of swellable starch and 0.2 parts by weight of tartaric acid were sprayed with 7.65 kg. of a mixture of 90.0 parts by weight of hydrogenated groundnut fat, acid value <0.1, I.V. 70, rising melting point 32 to 34°C., dilatation at 20°C. 1250, 5.0 parts by weight of lecithin and 5.0 parts by weight of diacetyl tartaric acid-mono-/-di-fatty acid glycerides based on tallow fatty acids with a rising melting point of 37°C.

Example 5

20 kg. per hour of a pulverulent mixture at 29.0 parts by weight of skimmed milk powder, 28.5 parts by weight of sugar powder, 14.2 parts by weight of glucose, 3.6 parts by weight of vanilla sugar, 0.6 parts by weight of egg white powder, 3.6 parts by weight of carob bean kernel flour and 0.5 parts by weight of citric acid were sprayed with 5 kg. of a mixture of 85.0 parts by weight of hydrogenated groundnut fat, acid value <0.1, I.V. 70, rising melting point 32 to 34°C., dilatation at 20°C. 1250, 5.0 parts by weight of lecithin and 10.0 parts by weight of lactic acid monoglyceride.

Example 6

Analogous to Example 1, 20 kg per hour of a pulverulent mixture of 74.5 parts by weight of skimmed milk powder, 0.5 parts by weight of sodium cyclamate, 0.5 parts by weight of complete egg powder, 3.6 parts by weight of swellable starch and 0.4 parts by weight of citric acid were sprayed with 5 kg of a mixture of 85.0 parts by weight of hydrogenated groundnut fat, acid value <0.1, I.V. 70, rising melting point 32 to 34°C., dilatation at 20°C. 1250, 5.0 parts by weight of lecithin and 10.0 parts by weight of lactic acid monoglyceride. The cream powder obtained is excellent for the production of cream for the decoration or filling of pastry for diabetics.

These cream powders are suitable as a base powder for numerous forms of application. For example, 55 ml. of hot water can be added to 100 g. of cream powder and the mixture

stirred until smooth with a domestic stirring device, the mass is allowed to cool to room temperature, then is beaten for 3 to 5 minutes and allowed to swell for a few minutes. The thereby obtained "light" fat cream may be used for filling tart shells, meringues, Moor's heads and for decorating tarts.

For the production of creams with certain prevailing tastes the following standard recipes are suitable:

	Prevailing taste				
	Chocolate	Mocha	Nougat	Nut	Curds with fruit
Cream powder	g. 100	g. 100	g. 100	g. 100	g. 100
Hot water	50	50	50	50	45
Chocolate	10				
Cocoa	3		1		
Coffee powder		2			
Nougat material			20	5	
Grated hazel nuts				10	
Curds, dry					100
Fruit					25

For the production of a "heavy", i.e. fat-rich fat cream, for example, 25 g. of butter or margarine are added to 100 g. of cream powder, stirred until smooth with 50 ml. of hot water and further processed as indicated above.

A substantial advantage of the cream powders obtainable according to the invention is that in a single operation they can simultaneously be brought together with the desired amount of fat with its consistency at room temperature and hot water and stirred smooth. A storage experiment in the deep freeze container over a period of 6 weeks had the result that cakes filled with the creams according to the present invention remained practically unchanged.

WHAT WE CLAIM IS:—

1. Free-flowing, dry, fat-containing cream powders, which comprise 65 to 85% by weight, based on the total weight of the cream powder, of a pulverulent component, consisting of 25 to 99% by weight, based on the weight of the pulverulent component, of a protein-containing product, 1 to 5% by weight, based on the weight of the pulverulent component, of stabilising or binding means, and up to 70% by weight, based on the weight of the pulverulent component, of sugar and/or other optical additives usual in creams, as well as 15 to 35% by weight, based on the total weight of the cream powder, of a fat component, consisting of 80 to 95% by weight, based on the weight of the fat component, of an edible fat with a rising melting point between 30 and 35°C. and a dilatation of 800 to 1500 at 20°C. and also 5 to 20% by weight, based on the weight of the fat component, of a fat-soluble emulsifier with a HLB value of from 5 to 16, while the pulverulent component encases the fat component.

2. Cream powders according to claim 1, having 70 to 80% by weight, based on the total weight of the cream powder, of the pulverulent component, and 20 to 30% by weight, based on the total weight of the cream powder of the fat component.

3. Cream powders according to claims 1 and 2, wherein the pulverulent component comprises 27 to 40% by weight, based on the weight of the pulverulent component, of the protein-containing product.

4. Cream powders according to any of claims 1 to 3 wherein the stabilising or binding means is swellable starch.

5. Cream powders according to any of claims 1 to 4 wherein the fat component comprises 85% to 93% by weight, of the edible fat and 7 to 15% by weight of the fat-soluble emulsifier.

6. Process for the production of cream powders according to claims 1 to 5 which comprises spraying the molten fat component onto the mixture of the remaining pulverulent

components of the cream powder in free or retarded fall.

7. A cream powder substantially as hereinbefore described with reference to and as illustrated in the foregoing examples.

8. A process for producing a cream powder substantially as hereinbefore described with reference to and as illustrated in the foregoing examples.

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1294426 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

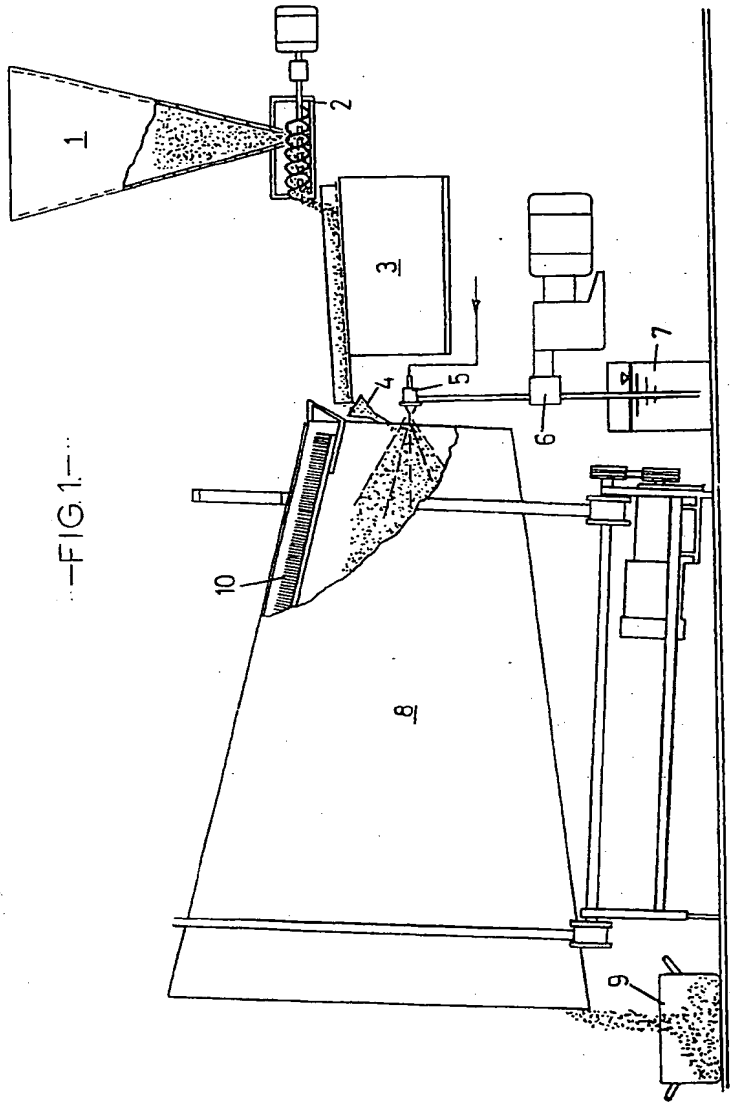
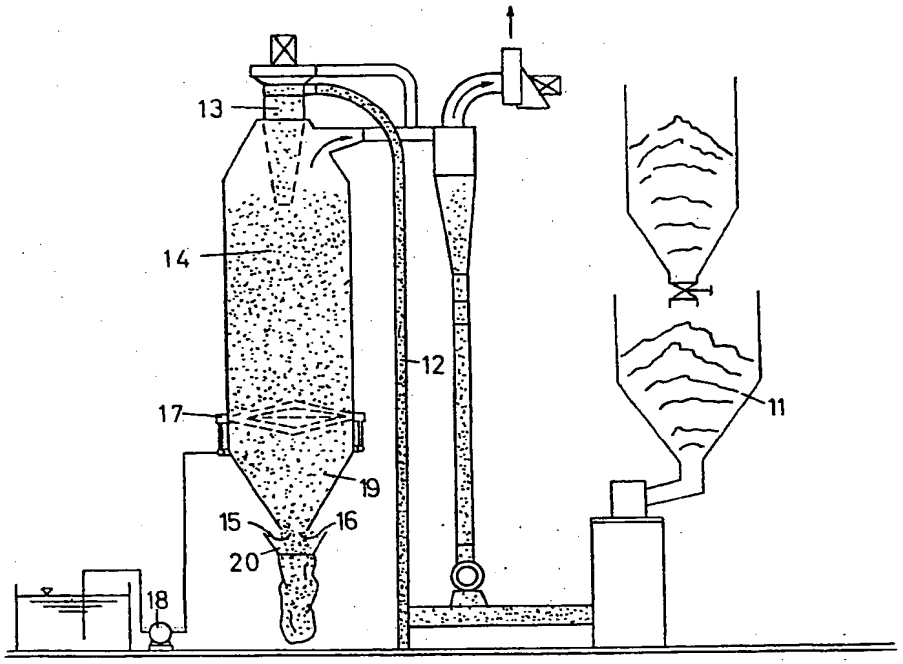


FIG. 1.

1294426 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2



—FIG. 2—